50X1-HUM

CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

REPORT

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SUBJECT Development of an Alloy for the Production of Spheralytic Cast Iron

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1. After experiments conducted over a period of nine months at the South Works, Bitterfeld, and in the Becker firm, Leipzig-Leutzsch, an alloy for the production of spheralytic cast iron has been successfully developed. Experiments will continue in order to develop a simpler alloy, since that described below is very expensive, from the point of view of both the cost of production and the cost of raw materials. There is wide scope for the use of spheralytic cast iron for the manufacture of rollers for rolling-mills.

2. The alloy consists of:

Magnesium	approximately	20%
Iron	"	12%
Nickel	"	12%
Copper	"	33%
Silicon	"	23%

The most important element is magnesium, which permits the finely-divided graphite to coagulate in globules. This increases the ductility of the cast iron by 4% and its strength by 20%. Three percent of alloy is used per ton of cast iron.

3. The addition of the alloy to the cast iron takes place either by simultaneous pouring into a pan, or by the introduction of the alloy into the bottom of the bath, the mixture being continually stirred by an iron rod covered with fire clay. The iron content of the alloy may also be added in the form of ferrosilicon which melts more readily than pure iron.

4. The process for the smelting of the alloy is as follows:

First, the pure copper is melted, and the temperature of the bath is raised to approximately 1,400°C. The corresponding proportion of nickel which has first been made red-hot to insure ready mixing is then added. Particular care must be taken to insure that the nickel is completely melted. The bath is stirred continuously. It is necessary to maintain a permanent protective layer on the surface of the metal, consisting of 50% salt and 50% sylvinite. If this protective layer is broken during the stirring, it must be renewed.

Once the nickel has melted completely, the surface slag is removed and iron in the form of 40-50% ferrosilicon is added. This floats and care must be taken to

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insure that it mixes properly. After this has melted, pure silicon is added and the mixture is thoroughly stirred.

At this point the surface slag is again removed, and small quantities of large lumps of magnesium are added. This, which must be pushed well below the surface melts quickly and to prevent its catching fire, the contents of the furnace must be quickly poured off into a cooling mold. The alloy is subject to very rapid oxidation, and, to prevent the magnesium from catching fire in the mold, the [illegible] molten metal must be covered with amorphous sulphur from time to time while it is cooling off. In spite of the fact that this process is accompanied by severe fire, less than 10% of the metal is in fact consumed while being poured off.